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Citrus Insect Control
For Fall 1960

RS State Plant Board Programs
Involving Citrus

M Opening of the 1960
Hurricane Season

Some Recent Work
On Citrus Sections

Lake Hamilton Cooperative
Expansion

The Use of Wind Machines
For Frost Protection—
1959-60

Soil Science Foundation's
Approach To Acid Flat-
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Production

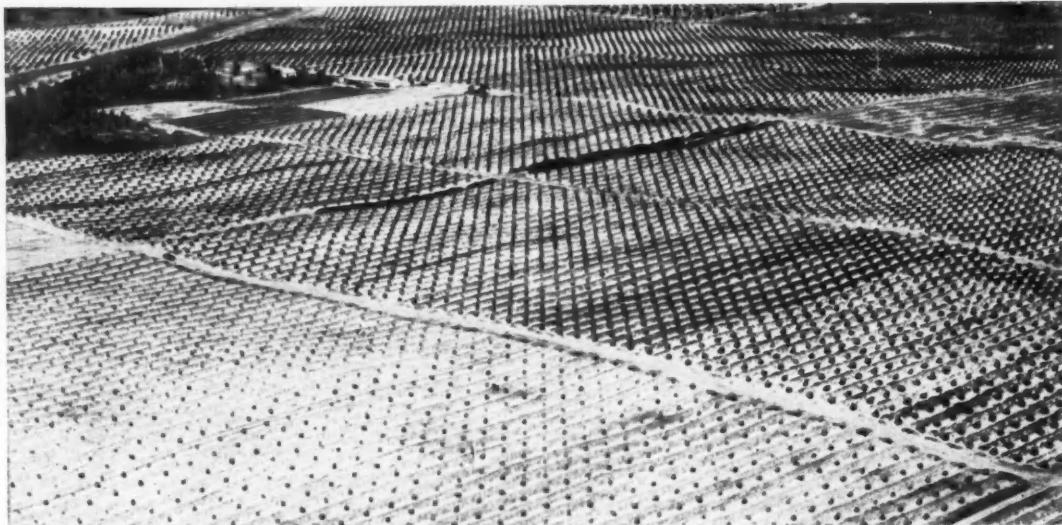
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Citrus Insect Control For Fall 1960



R. B. Johnson

R. B. Johnson
W. L. Thompson
W. A. Simanton



W. L. Thompson

Florida Citrus
Experiment Station
Lake Alfred,
Florida



W. A. Simanton

Rust mite populations increased to generally moderate levels in July and will continue to increase to a moderate peak in mid-August. Although there will be a decline in September, rust mite is expected to be increasingly abundant during October, November and December. During the fall rust mite are more numerous on fruit than on leaves and growers should keep this in mind when checking groves.

Citrus red mite (Purple mite) populations reached a peak early in July and have since declined. This decline will continue until about mid-September when an increasing trend will begin. Citrus red mite will be fairly numerous in October and somewhat more numerous in November and December. Texas citrus mite populations will behave in a similar manner.

Florida red scale populations have been below average levels since 1959, but suddenly increased to above average in mid-July. Although populations are expected to be about average in August and September, this scale will be a major Fall pest in a few groves. Populations will vary greatly between districts and groves.

Chaff scale populations have been the highest on record. In past years this scale has started to increase during September. Groves will have to be watched carefully for this pest, especially where the fruit is intended for the fresh fruit market.

Purple scale populations are extremely low. This scale will be a minor fall problem.

SPRAY PROGRAM

The aim of the summer spray, applied in June or July, is to prevent

greasy spot disease on the summer flush and to eliminate the need for additional control of rust mite and scale insects at least until September. This application rarely fails to control scale insects for the desired interval when a scalicide is employed, but rust mite may become a problem in August. This is most likely

few groves will probably need copper for greasy spot. Its aim should be to control mites until after bloom the following spring. With this in mind, it is advisable to delay the application as long as possible because the later the spray can be applied, the shorter the interval to postbloom and the greater the chance of obtaining the

SCALE AND MITE ACTIVITY BY DISTRICTS*

District	Purple Scale	Red Scale	Purple Mite	Rust Mite Fruit
West Coast	1.67	1.03	1.99	2.00
Indian River	1.01	1.83	2.20	1.16
Upper East Coast	.29	2.67	2.33	1.84
Gainesville	.73	.40	2.00	.40
Orlando	.73	1.25	2.58	1.09
Brooksville	1.45	1.28	1.13	.25
Ridge	1.34	2.30	2.09	1.95
Bartow	1.07	2.93	1.40	2.89
State Average	1.18	1.86	2.02	1.50
Last Year	2.98	3.78	1.27	2.54

* Second week in July. Activity is computed from populations, number of groves with increasing or decreasing infestations and percentage of scales in the settle crawler stage. In this table, activity is considered high if above 2.0 for purple scale, 1.0 for red scale and 1.5 for mites.

to occur where the summer spray was applied in early June, where rust mite was numerous at the time of application, where copper was used with zineb, or where sulfur was used instead of zineb or Chlorobenzilate. This year Florida red scale or chaff scale may become an additional August problem where the summer scalicide was omitted.

If both scales and rust mite become numerous in August, each may be controlled with the same spray. If, on the other hand, rust mite alone is a problem, a sulfur dust is economical and quick to apply, but sulfur sprays are preferred because of the longer control they produce. If neither rust mite nor scales are an August problem, the next spray should be delayed until needed for fall greasy spot, scale, or mite control.

The fall spray is primarily to control rust mite, citrus red mite and Texas citrus mite; but scale control may occasionally be required and a

desired control. This spray should not, however, be delayed until high populations have developed. A good time to apply the fall miticide is when about 20% of the foliage is infested with any of the injurious mites. However, if scale or greasy spot control is required before time to spray for mites, the application should be timed for these other problems and include miticides.

SCALE CONTROL: Since purple scale infestations are at a low level and red scale is expected to be about average, a second scalicide will not be needed in most groves during the late summer and fall months.

A few heavy red scale infestations have been reported and a second scalicide may be necessary where the fruit and leaves were heavily infested before the summer scalicide was applied. Where red scale was abundant at the time of the summer scalicide application the grove should be checked for living scale four to six weeks

(Continued on page 13)

*Written July 21, 1960. Reports of surveys by Harold Holtsberg, Fort Pierce; J. W. Davis, Tavares; K. G. Townsend, Tampa; T. B. Hallam, Avon Park; and L. B. Anderson, Jr., Lake Alfred.

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State Plant Board Programs Involving Citrus...

PRESENTED AT THE 7th SOUTH FLORIDA CITRUS INSTITUTE, MAY 31, 1960

The Florida Plant Act which created the State Plant Board directs that the Board protect the agricultural and horticultural interests of the state from insect pests and diseases.

In the years since the Board became reality, people have more or less identified the organization with guardianship of the state's booming nursery industry. That is one of the Board's principal assignments, of course, and the picture of a plant inspector in an ornamental nursery has become something of a symbol of its work.

Nevertheless, the State Plant Board devotes almost half its time to citrus through one program or another. These programs include Budwood Registration and the Budwood Foundation Planting, Spreading Decline and nursery site selection, and fruit fly detection. An equally important task is that of citrus nursery inspection.

In the realm of nursery inspection, it might be well to point out that State Plant Board records for the past year show that ornamental plants were grown on 4,015 acres in Florida as compared with 3,463 acres given over to the production of citrus nursery stock.

The State Plant Board and the Federal Agricultural Marketing Service spent three years compiling a census of every citrus tree in Florida, and although that count was affected

somewhat by the freezes of 1957-58, the table is being used by various state and federal agencies. At the present time, plans are being reviewed with Agricultural Marketing Service to start with a resurvey of the citrus area to bring the census up to date.

In addition, trapping has been continued since the invasion of Florida by the Mediterranean fruit fly in 1956 — a necessary check against the return of that or any other dangerous fruit fly.

Without fumigation or certification by the State Plant Board, much citrus would be unacceptable in other states, especially those in which citrus is grown.

From this you can see very well that the State Plant Board is very much involved in the citrus industry of Florida.

The State Plant Board observes and checks the progress of the young citrus plant from its beginning in the nursery through maturity in the field. Somewhere along this line of the tree's life and development you will find one or more of our programs.

Site selection comes at possibly the earliest stage, requiring that citrus nurseries be planted so that young stock will not be exposed to the burrowing nematode responsible for spreading decline. Even the plants to be placed on these sites must be thoroughly inspected to make certain

they are not infested with this pest.

The Budwood Registration Program also is concerned with the early development period, seeking out parent trees that are free of citrus virus diseases. These qualified parent trees are necessary as sources of clean budwood.

The Spreading Decline Program, naturally, is concerned with trees of all ages that might be suffering from this disease.

Let me make a brief comment here about this budwood program. The Board's efforts along this line are unique and are being watched by the entire citrus-producing world. I think we are on the right track in this program and that the results will help not only Florida growers, but growers in every citrus state and nation around the globe.

Once a citrus tree has reached maturity, it is the State Plant Board's responsibility to protect that tree against pests such as the nematode and the fruit fly and against diseases like the viruses tristeza, psorosis, xyloporosis and exocortis. The methods used in this respect are subject to change and are mainly contingent upon the findings of the Citrus Experiment Station at Lake Alfred and, to a lesser extent, upon the work of our own trained technical men in laboratories at Gainesville and Winter Haven.

This idea of change is best ex-

plained by the following statement:

"The Citrus Industry is a specialized publication, and as such, it must be representative of every interest in the citrus industry, and yet it must not represent any special interest."

emphasized in the Spreading Decline Program which for the past five years has called for the pushing of diseased citrus trees and the treatment of soil. In that period of time, the State Plant Board has pushed and treated 5,236 acres of decline-infested trees, principally in Polk and Highlands counties. And although approximately 6,000 acres remain to be treated, we are devoting time at the present to the investigation of the use of a chemical that promises to control the burrowing nematodes without doing harm to the tree.

This was not possible with other chemicals tested by Dr. Ross Suit and his co-workers at the Citrus Experiment Station. These men found that some chemicals were toxic to the trees while others did not register any appreciable kill of nematodes.

In the dozen years which Dr. Suit and his associates have devoted to a study of this disease of citrus many hundreds of methods have been tested. To date, the push-and-treat method has been approved by the Citrus Experiment Station staff as a known control for the burrowing nematode. Although this method is controversial, it has proved relatively successful and has contributed heavily toward holding the disease in check while scientists pushed forward in search of a more acceptable method of control.

But more about that in a few minutes. Let me first of all touch on some of our other programs in a bit more detail.

I might point out right here that we have enjoyed excellent cooperation from most citrus growers in the administration of our programs and that it will be absolutely necessary that we have this same sort of cooperation for the success of all future programs.

It has been this admirable spirit of cooperation that has helped tremendously in the matter of site selection for citrus nurseries. Thus far we have approved 1,536 sites for commercial citrus nurseries.

The State Plant Board uses certain yardsticks in determining the best spot for these nurseries, based upon the distance of the site from known areas of decline. The required distance varies with the type of decline area, whether it is a diseased citrus grove or a dooryard planting of host ornamental plants. This rule has no doubt worked a hardship in some cases and only the cooperation of the grower in these instances has made the program work. It has worked, and we feel reasonably certain that all future plantings of citrus in com-

mercial areas will be free of the burrowing nematode because the young stock was produced free of the pest.

In those instances where our recommendations are not followed in the selection of a nursery site, stock produced on the unapproved site must be hot-water treated before being planted to commercial acreage.

This program of nursery site selection is important and will remain important until that time when spreading decline no longer is a threat to the Florida citrus industry.

As was said earlier, the State Plant Board is investigating the idea of treating decline-diseased trees in place in an effort to determine if this is the answer to the decline problem. This work parallels that of the Citrus Experiment Station, but is being conducted on a field scale and therefore should be indicative of the success or failure of such a treatment method. We are taking the idea into the field and giving it complete and practical demonstration.

Growers who have despaired of curing decline groves by any other method have offered ailing trees for experimental purposes. In State Plant Board tests, DBCP has been used in citrus nurseries and in young and mature groves. The number of applications has been varied from three to four and more and the chemical has been applied under every conceivable condition.

Groves have been plowed and harrowed and trees have been hedged and buck-horned in providing many of these conditions. Wetting agents have also been used experimentally in preparing the ground for this chemical application. We trust we aren't missing a trick in our efforts to thoroughly check out this method. If one idea of applying the material doesn't work, then any one of the dozen of others might turn out to be the answer.

Everything the Board has attempted to date and everything contemplated for the future in this experimental work has been and will be undertaken only after consultation with Dr. Suit and his associates.

Root samples from these treated areas are to be taken within the next few months and may provide some of the answers being sought by the Citrus Experiment Station and the Plant Board.

In reference to the Budwood Registration Program, I think something should be said about the Foundation Planting. Foundation Planting is nothing more than a term to many of you, so I would like to take a

moment to explain what is meant by this term.

The Plant Board's Foundation Planting is a grove that has been set out with what might be referred to as "pedigree" stock. This grove is located about eight miles north of Haines City on U. S. Highway 27 and now contains 21 acres of rootstock which is being budded at this time. Another 25 or more acres have been cleared and plowed and will be planted as quickly as possible. Rootstocks in the foundation plot are sweet lime, lemon, sour orange, Cleopatra and trifoliate orange.

This pedigree grove also contains 268 nucellar seedling trees.

For many years the Plant Board has maintained and will continue to maintain a nursery at Winter Haven in which budwood from acceptable candidate trees is carefully tended and indexed. To continue surveillance beyond the nursery level, it was necessary to make regular calls around the state to inspect these candidate trees.

With the Foundation Planting, we will have young, mature and older trees in one plot where they can be checked at will. In addition, we will be able to learn a lot more about the original source of budwood by having trees of the same variety growing under similar conditions and on similar soils. There was no real comparison before when the process of checking out one variety of citrus might involve trees planted many miles apart and grown under varying conditions and on vastly different soils.

Actually, the Foundation Planting will serve as a budwood bank—a collection of the very best bud strains of commercial varieties produced in Florida and made available to the citrus industry at all times. That, I think, is the nearest thing to a real definition of the planting.

There are a number of reasons for this planting, of course, foremost of which is the need for distributing fairly the budwood from outstanding trees which have been acquired by the Plant Board. Also, there is a need for a continuous virus indexing of parent trees and an evaluation of nucellar seedling lines in comparison with old line clones. An unexpectedly high rate of virus incidence which has appeared recently in "old line" selected trees also made the foundation planting advisable.

To give you an idea of what a lengthy procedure this program is, let me point out that each clone of every variety of tree that is brought into the foundation grove will be

budded across the five different rootstocks planted there. That will mean a wait of many years for some of the answers to the virus problem. The sour orange rootstock is to provide a continuing check for tristeza; sweet lime a check for xyloporosis; trifoliolate orange a check for exocortis, and Florida rough lemon and Cleopatra mandarin as checks on the control tolerance of the budwood to all three of these virus diseases.

The Foundation Planting also is to provide leads in regard to the quality of fruit produced by these various virus-free citrus trees. The matter of quality is another important issue with the citrus industry, both with the fresh fruit operators and the concentrators.

For the record, tristeza was first found in Florida in 1952, and although not as severe as the same virus found in other parts of the world, the ailment nonetheless can and could cause trouble in the state. South America has reported the most difficulty with the virus, with many thousands of trees budded on sour orange rootstock being killed outright. Commercial rootstocks in Florida, fortunately, are principally the Florida rough lemon, Cleopatra mandarin and the sweet seedling, all of which are tolerant to tristeza.

Trouble looms, however, in the fact that since the 1957-58 freezes many trees budded on sour orange rootstock again are being sold and propagated. In addition, aphids have been blamed in recent months for the spread of tristeza in one part of Orange County. At least a dozen registered parent trees, originally free of tristeza, have been found infected during routine rechecks in various areas of the state.

The Foundation Planting, I think, will turn up the answers to most of these current questions.

Budwood registration, incidentally, has caught on well with Florida citrus growers and nurserymen. In 1958 there were only 65 participants in the program as compared with the 258 now enrolled. There are 108 nurseries producing registered budwood against 22 in 1958, and the number of scion groves has jumped in two years from 24 to 228. It has been necessary to increase our personnel on this program from five to eight persons, and further increases in personnel are anticipated.

Nursery inspection might be considered in some quarters as a routine operation that consumes much of the plant inspector's time. It is time-consuming, but worth every minute spent in the nursery. This is the

Skinner Chairman Citrus Commission's Advertising Comm.



Bruce W. Skinner of Dunedin was recently named chairman of the Flo-

one spot where it might be easiest to detect any serious insect pest or disease that might slip into the state.

Don't overlook the possibility of an insect enemy slipping into Florida. For example, the Mediterranean fruit fly was intercepted 94 times at ports of entry during 1959. This year the number of interceptions leaped to 178. Interceptions of the khapra beetle totalled 44 a year ago and almost doubled to 75 this year. At the New York port of entry alone, plant material interceptions have increased by 27 per cent. These figures are indicative of continued increase in international travel bringing insect pest and disease problems closer to us each day.

Plant Board certification is one of the most widely sought seals of approval offered by a state organization. This certification is necessary for the movement of all nursery stock and for a considerable amount of citrus and vegetables destined for out-of-state shipment. California, Arizona and Texas exercise tight controls on citrus received from this state and have established exacting requirements as safeguards against any but certified fruit. Only fumigation under Plant Board supervision, or certification by a Plant Board inspector, can unlock the quarantine doors into these states.

The State Plant Board has a big job and the ever-increasing size and importance of the citrus industry make the job even bigger. The work can be made a lot easier and more simple by your continued cooperation.

rida Citrus Commission's important Advertising and Merchandising Committee which administers almost 90 per cent of the more than \$7 million annual budget of the Commission.

Skinner, 44, has been a member of the Commission since 1956. He was appointed that year by Governor LeRoy Collins, and subsequently reappointed in 1958 and 1960. Commissioners serve without pay and are appointed by the governor for two year terms.

He is a native of Dunedin and attended the University of Florida and the Graduate School of Business Administration at Harvard University. He and his father, B. C. Skinner, have been associated with the citrus industry for many years. He is presently serving as general manager of the citrus division of H. P. Hood and Sons, Inc., in Dunedin, a large concentrate operation.

While a member of the Commission, Skinner has served on many of its vital committees. He has been on the Advertising and Merchandising Committee for four years. He has also served as chairman of the important budget committee since 1957.

Other committees on which he has served include the Research Committee, the Concentrate Committee, Bond and License and Grapefruit Rebate Committees, Administrative Committee, and the Processing Committee.

CITRUS CRYSTALS USED ON USS TRITON SUBMARINE

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TECHNICAL CHEMICALS DEPT., NIAGARA CHEMICAL DIVISION, FOOD MACHINERY AND CHEMICAL CORP., MIDDLEPORT, N.Y.

The Use Of Wind Machines For Frost Protection Of Florida Citrus--1959-60

Introduction

The 1959-60 winter season provided a few occasions to extend our investigations of the usefulness of the wind machine for modifying the temperature on critically cold nights. Studies were continued in the Andre Pink grapefruit grove near Lake Garfield and in a citrus nursery near Babson Park. The machine used in the former was a 25 H.P. electric Tropic Breeze, while in the latter a 60 H.P. Tropic Breeze powered with an industrial gasoline engine was used. These studies were made with the cooperation of Lake Garfield Nurseries Company, of Bartow, Florida.

It is desirable to compare temperature values and trends, where the machines are operating, with those at some nearby location which exhibits similar temperature characteristics. We refer to the latter as a control station. The physical nature of the environments (soils, topography, tree size, etc.) of both test and control locations should be reasonably similar. These restrictions were met at the nursery site, but it was impossible to satisfy them in the mature grove tests.

Here, recent agricultural activities have significantly altered the macroclimate of the control area by making warmer than it was during the previous season; and as a consequence, temperatures at the control station were often 3-5 degrees above those at a similar station inside the mature grove. This fact complicates the analysis of the data to some extent.

December 7-8, 1959

Citrus Nursery

This was a clear night with light northerly winds and periods of calm. Protection in the nursery was needed, as pockets in the vicinity of the control station reached lows of 24-28° while higher ground was 27-30°. The machine was used during the most critical period, having been turned on at 4:00 a.m. The machine caused about a three degree rise 250 ft. south of the machine and little more than a leveling off tendency in the pocket 275 ft. to its north. In the control area, temperatures continued to fall slowly until the natural warming trend about 6:30 a.m. The net result of these temperature trends produced about 5-6 degrees protection 250 ft. south of the machine and

J. G. GEORG, Meteorologist

about one degree on the north side at 275 ft. The protection 100 ft. closer to the machine in all directions was 1-2 degrees larger.

January 19-20, 1960

Andre Grapefruit Grove

This was the first night of the prolonged January cold spell, and protection was not needed. However, the thermostat turned the machine on twice during the night when the air temperature reached 34°. Analysis of the continuously recorded temperature data inside and outside of the area affected by the machine adds to our understanding of the capabilities of the machine.

The night was clear except for some thin cirrus and dense cirrus stratus clouds that persisted up to about 30° above the eastern and northern horizons from midnight until the end of the observation period. There was a measurable wind from the north or northwest during the entire night. At the control station in a newly set grove bordering the test grove on the east, velocities were measured with a sensitive anemometer as follows:

Sunset to about 12:30 a.m. 3-5 MPH
12:30 a.m. until near 2:00 a.m. 3-5 MPH
2:00 a.m. until near 4:30 a.m. 3-6 MPH
4:30 a.m. until sunrise 5-8 MPH

Natural wind velocities were somewhat less inside the test grove, diminishing from 3.0 MPH at 10:30 p.m. to 1.5 MPH at 12:25 a.m. or just prior to the time the machine became operative. Since the rises and falls in the natural wind coincided very closely with the on and off times of the wind machine, the effect of the machine on the temperature was small and mostly obscured but not insignificant.

Accurate checks over numerous short time intervals during the first period the machine operated, showed increases of 6.7 MPH in the wind velocity 270 ft. east and southeast of the machine when the blast wave passed the anemometer. Velocity fell off sharply as the blast passed, but there remained enough natural wind after the blast wave has essentially decayed to continue the mixing to some extent.

There is some evidence that the most pronounced rises in the grove temperature were not entirely the result of increases in the natural wind, and that grove temperatures may have been a degree or two colder had the machine not operated. This is a point for scrutiny as it has been noticed repeatedly that the durations of the critical temperatures are appreciably less in areas where machines are used as compared to unprotected areas, provided the natural wind is not constantly in excess of 6-8 MPH.

The vertical temperature profile was different at the control station. Here a 2 degree inversion persisted all night in spite of natural wind velocities that sometimes approached 10 MPH.

Since the natural wind in the open did not prevent this small inversion, it seems reasonable to assume the wind machine destroyed the slightly larger one of the grove where the natural wind was less. On nights of continuous light and fluctuating wind, the trees obstruct the air flow and depress the natural mixing sufficiently to permit a larger inversion than in an open area, except at the periphery.

This is the main reason the inversion in the grove was about 1 degree greater than that in the control area prior to the first time the machine operated. It is also one of the reasons why the rate of temperature fall at grove level was a little greater than the rate of fall at machine height during the interval 1:30-4:30 a.m. when the machine was inoperative.

The eddy diffusion of heat simply could not cancel out the greater radiative losses at grove level. This was not the case in the control area. There, eddy diffusion (small as it was) was canceling out the radiative heat losses from the boundary layer to the extent that the temperature of the entire strata of air to the height of the inversion tower was falling at about the same rate. To increase the turbulence of the air is to increase the eddy transport of heat, and even under conditions of comparatively high air density and light wind the flow is much more laminar where there are no machines operating. By virtue of their thrust and pitch the machines induce tur-

bulent flow which is exactly what is desired.

January 20-21, 1960
Andre Grapefruit Grove

Wind and clouds (altocumulus) eliminated the necessity of using the machine. Temperature fall was very slow due mostly to the wind.

The temperature change in the grove was insignificant until about 3:30 a.m. due to the combined effects of a northerly wind in excess of 8 MPH (gusts to 14) and scattered to broken cloudiness passing over the grove. But when it became mostly clear over the grove during the hours 3:30-6:00 a.m. and measured net outgoing radiation was its strongest, air temperature fall in the grove was still on slightly more than 1°/hr. Had it not been for the mixing by the natural wind, temperatures would probably have fallen to the middle or low twenties at this location. The foregoing is intended to show how the turbulent transfer of heat can greatly retard the effectiveness of radiant heat loss, and this is the primary function of the wind machine.

January 21-22, 1960
Citrus Nursery

The wind machines were operated from about 10:45 p.m. to 5:00 a.m. This included the two periods when there were rather sharp temperature drops followed by rapid rises, a phenomena quite common to the entire region on this occasion. Since the warming trends were caused by variances in the natural wind, and since they boosted temperatures above the freezing level for most of the night, the effectiveness of the machines was limited and mostly obscured. However, an excellent example of machine protection was recorded during the first and most critical temperature fall.

This shows a continuous and rapid fall at the control station from 10:00 to 11:40 p.m. when the minimum was reached. In the protected area there was about a 1 degree rise at the station 250 ft. south of the machine in the half hour period after the machine was operated, and the temperature leveled off during the same time interval at the station 275 ft. north of the machine. After this original leveling off or rising period, there was a sharp drop at all stations in the machine area. Nevertheless the minima were considerably higher in the wind machine area, and the durations of sub-freezing temperatures were greatly reduced.

January 22-23, 1960
Grapefruit Grove

The complexity of meteorological phenomena during this night defies

accurate description. Actually two different cold air masses controlled the picture. Wind velocities were 2-4 MPH outside of the grove, 0-1 MPH inside, until the arrival of the second cold air mass about 3:00 a.m. Then the wind veered from a southwest to a northerly direction and became 5-8 MPH outside and 3-6 MPH inside most of the remainder of the night. During the transition from one air mass to the other there was a slight increase in temperature aloft followed by the formation of cirrus clouds and finally their dissipation which marked the advent of colder, dryer air. After the arrival of the second air mass, the falling temperatures were a consequence of both radiation and advection.

The thermostat turned the wind machine on at 9:15 p.m. and it ran for the remainder of the night. The air temperature 270 ft. southeast of the machine never fell below that level at which it was when the machine turned on until 4:40 a.m. This was also true at the stations 180 ft. east and 180 ft. west of the machine, but it was not true outside of the machine area. However, the stations east and west were a little colder than the control station as usual.

During the interval 3:00-7:30 a.m. a rather uniform 8-9 degree temperature drop occurred at all stations east, west, north and south of the wind machine as well as in the control area. There is no evidence that the machine slowed the sharp fall in this grove. But in the southeast direction, where the machine had maintained a higher temperature level than elsewhere, the subsequent durations of freezing or lower were reduced.

January 23-24, 1960
Grapefruit Grove

This was the only night of the January freeze that protection was needed for mature citrus. While critically low temperatures were also experienced at other times, their brief durations eliminated the necessity of using protective measures at this location. There was a measurable wind of 1.5-3 MPH all night in the control area, but it was calm inside the grove except for the wind from the machine. The sky was clear.

All thermometers in the grove were registering 3-4 degrees colder than those in the control area prior to the time the wind machine operated. Again, the greatest protection was downdrift or in the south and southeast quadrants. The drift was out of the northeast for a short time before midnight and again for a couple

hours before sunrise, but it was predominantly north-northwesterly. After the machine became operative, grove temperatures remained as high or higher than those in the control area for most of the remainder of the night. There is no question that grove temperatures would have been lower and durations longer in the grove had the machine not been used. Excluding protected areas, the control station was the warmest location noted within a 4 mile radius on this occasion. The important thing to note is that the machine abolished the 3-4 degree differential between grove and control areas and afforded even greater protection at most stations in the grove.

Attention is called to an important feature that occurred between 3:00 a.m. and 3:30 a.m. At the station east of the machine the temperature was rising during this period while there was a rather sharp drop taking place in the area west of the machine. This was a consequence of an interval of westerly drift, and it is an excellent example of the shifting nature of the protection pattern that results from seemingly minor, sometimes not measurable, direction and velocity fluctuations.

The foliage on the trees remained dry until about 3:30 a.m. when it began to show some dampness. Light frost began to form around 5:30 a.m. At daybreak there was a light frost on the soil inside and outside the grove. The condition of the foliage varied. Some was damp, some was completely dry, and some was touched with light frost. Damage to foliage was inconsequential. The condition of the fruit was excellent, both pink grapefruit and valencia oranges. No ice was found in any fruit in this grove.

January 23-24, 1960
Citrus Nursery

Very light northerly winds with brief periods of calm prevailed most of the night at the Babson Park Nursery. However, there were periods when the direction of the drift became west or northwest. Temperatures south and north of the machine were very nearly the same as those in the control area prior to the operation of the machine.

Note the fall in temperature which occurred in the machine area from about midnight until 1:20 a.m. The temperature in the control area was rising during most of this interval. It is believed that this was due to the combined effects of a slight shift to the west in the natural drift and the proximity of heated areas. Beyond 100 ft. west of the control area

fires were used to protect a cold pocket. Fires were also used in a low area northwest of the machine, but none of these were within 40° — 500 ft. of the machine.

Probably all thermometers in the machine area and the control area were affected to some extent by the fires, but those in the control area were most likely to have been affected the greatest. The fires were lit in both areas within one hour of the machine starting time.

March 4-5, 1960

Grapefruit Grove

This was the coldest night at this location in a series of cold nights that occurred in early March. The wind machine was operated to protect bloom from low temperatures and frost. Clear skies and very light winds (1-4 MPH) prevailed all night. The direction of the air movement varied between NNE and NW when velocities were lowest, but it was predominately NW during the periods of higher velocity. The natural wind did not exert a comparable effect on the temperature of the more or less sheltered regions inside the grove. There, the uniformity of the temperature fall reveals the absence of much mixing by the natural wind. The temperature took a course similar to this at all stations inside the grove, the only pronounced change occurring at about 3:30 a.m. when the wind machine was made operative. Since the natural wind did not prevent a steady fall in temperature prior to the time the machine operated, it would seem safe to attribute the initial 4° rise and subsequent leveling off periods to the machine's operation.

In most research over the past years it has been extremely difficult to differentiate quantitatively the effects of the natural wind on the temperature as opposed to those of the wind machine. A rigorous analysis of the data often simply prohibited an accurate statement to the effect that the machine provided so many degrees of protection during any given period. There was usually too much danger of exaggerating the value of the machine. That danger is non-existent here. In fact the opposite may have been true, i.e., the machine may have provided more protection at times than it appears to have provided. Note that the air temperature in the control area was falling sharply during the first half-hour the machine operated while the temperature in the machine area was rising equally as fast.

Scattered light to moderate frost was observed in surrounding areas,

but none was observed in the protected grove. Foliage and blossoms were also free of dew. Little, if any, damage would likely have occurred in this grove had the machines not been used, but the value of the machine during spring frosts accompanied by lower temperature is evident.

Conclusion

The above research essentially verifies the conclusions drawn from previous work. See Weather Forecasting Mimeo 59-10, Federal State Frost Warning Service, dated April 21, 1959. In addition, we would again like to emphasize the fact that the protection down drift (natural wind

drift) from the machine is greater than all other directions and much greater than the up-drift direction. Since the direction of the drift is not the same on all cold nights and may even frequently vary during any given night, it follows that the protection pattern will similarly change.

Acknowledgement

We extend our thanks to Lake Garfield Nurseries, Bartow, Florida, for the splendid cooperation given us during the many seasons these investigations have been in progress.

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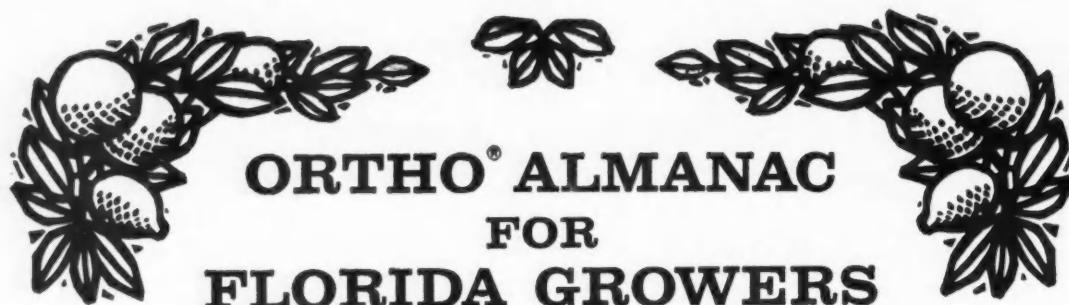
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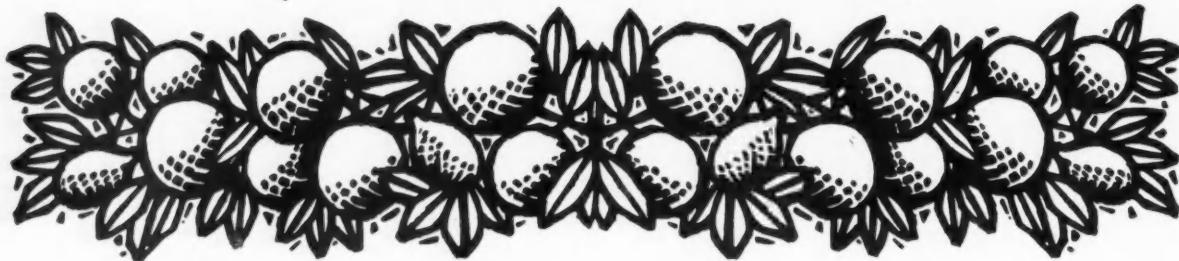
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CHARLES ASHLEY

Received his B.S. in entomology from Auburn. Worked three years citrus spraying and two years as a laboratory assistant before joining Calspray. Resides in Leesburg, phone ST 7-2063.



WEBSTER CARSON

Joined Calspray in 1956 after receiving his B.S. degree in agriculture from University of Florida. Resides in Plant City—contact him by calling 3-8351.



JEAN MABRY

Served as an entomologist for two years with the U.S. Army before joining Calspray in 1955. Received his degree in agriculture from U. of Florida. Jean resides in Lakeland. Call MU 6-4515.



J. S. MURPHY

Received his degree in agriculture from University of Florida. Before joining Calspray in 1955, worked at Citrus Experiment Station. Resides in Lake Alfred, phone FR 2-1422.



JOHN NOWELL

Received his B.S. degree in agriculture from University of Florida. Joined Calspray in 1955. John lives in Orlando. Reach him at GArden 4-6754.



RANDALL WILLIAMS

Randy sold livestock and poultry feeds before joining Calspray in 1957. Received his degree in agriculture from University of Florida. Resides in DeLand. Reach him by calling RE 4-0599.



CITRUS INSECT CONTROL FOR FALL 1960

(Continued from page 3)

after the application. Groves that did not receive a summer scalicide should also be checked. The tops of trees should be checked because coverage is not as thorough in tree tops as on lower limbs.

Chaff scale and purple scale cause green spots on the fruit. These spots will not degreen in the coloring room and will lower the grade, especially of tangerines as well as early varieties of oranges and grapefruit. If the fruit is found to be infested with either chaff or purple scale, the grove should be sprayed at once to prevent further infestation. The spray should not be delayed until late September or October because the spots where scale has settled will remain green even though the scale has been killed.

If black scale control is necessary, the scalicide should be applied in August or early September while the scale is still in the younger stages.

The preferred scalicides for August or later are 0.25 pound of technical parathion or 1 to 1.25 pounds of technical malathion per 100 gallon. Neither of these materials depresses soluble solids in the fruit juice or retards degreening, nor are they likely to cause as much leaf drop as oil emulsion.

Sprays containing oil are not desirable later than July. Oil is most likely to depress soluble solids and retard degreening of fruit when applied in August, September, or October. Furthermore, if oil was applied at any time during the summer, a second application made from August through October will have a greater adverse effect on solids and color than a single application. Under no condition should tangerines be sprayed with oil after July because it will prevent the development of good color. Trees sprayed with oil in October or later are more susceptible to cold injury and sometimes do not put out the normal amount of bloom the next spring. If oil should be necessary for any reason such as removing a heavy coating of sooty mould, use 0.5 percent oil plus either 0.15 pound of technical parathion or 0.75 pound of technical malathion per 100 gallon. The 0.5 percent oil will not retard degreening of fruit or cause as much leaf drop as 1.3 percent.

Because some oils are more highly refined than others does not mean that they will not cause leaf drop, depress solids or retard degreening as much as the less highly refined oil emulsions now on the market. The

amount of oil used per 100 gallon is more of a factor in causing leaf drop and retarding degreening than the type of oil.

GREASY SPOT CONTROL: Many growers delayed the summer spray in an attempt to cover the summer flush. In spite of this, the summer flush in many groves developed after the application and is unprotected against greasy spot. This may not be too serious where greasy spot has not been a severe problem, but in groves with a history of greasy spot it may be advisable to include copper in the fall application. Use 0.7 pound of 53% tribasic copper sulfate per 100 gallon or an equivalent amount of another neutral copper such as copper oxide.

Growers who plan to use copper in the fall spray should delay the application to cover the fall flush as well as the summer flush. If mites become a problem before the fall flush is mature, however, the fall spray should be timed for mite control.

MITE CONTROL: Three types of miticides are now available for use on Florida citrus. Tedion, Systox and DN Dry Mix No. 1 belong to one group and are distinguished from the combination miticides by the fact that they do not control rust mite, but do control citrus red mite and Texas citrus mite. The combination miticides Delnav, Kelthane and Triton not only control citrus red mite and Texas citrus mite, but are also satisfactory for rust mite control during the fall and winter months. The third group includes sulfur, zineb, and Chlorobenzilate which are effective only against rust mite and are used with Tedion, Systox and DN Dry Mix for combined mite control.

The fall and winter use of each of these miticides is discussed in detail below; but first a word about the rust mite miticide Chlorobenzilate. The Food and Drug Administration has recently questioned the suitability of dried citrus pulp as a feed for dairy cattle on the grounds that the pulp might contain chlorinated hydrocarbon pesticide residues that might go through into milk. Chlorobenzilate has been specifically questioned by the Food and Drug Administration. There is now much pharmacological information, obtained from rats and dogs, suggesting the Chlorobenzilate will not be found in milk even if present in small amounts in the feed. However, there have not been any actual milk studies with Chlorobenzilate. The manufacturer of Chlorobenzilate expects to obtain the necessary data and provide it to the Food and

Drug Administration in the next few weeks. Meantime growers should use Chlorobenzilate only after making themselves thoroughly familiar with the current week-to-week situation, by consulting the Citrus Experiment Station, the Extension Service Information Center at Gainesville, or the manufacturer's representatives.

TEDION — This miticide is believed to be harmless to the user and can be mixed with other materials used on citrus. It will give the longest period of control of citrus red mite and Texas citrus mite of any of the miticides, providing it is used properly. Tedion is a slow killer and should not be used without parathion or malathion after high populations have developed, but it is a long-lasting preventative treatment when applied thoroughly before mites become numerous.

Tedion is recommended in preference to other miticides for September and October applications, but it should not be used more than once a year. There are indications that repeated use will result in resistant mites.

Tedion is of no value against rust mite or citrus flat mites (*Brevipalpus* mites) and must be supplemented. Zineb at 0.5 pound per 100 gallon is recommended with Tedion for rust mite control except where copper is to be included or where flat mites must also be controlled. Sulfur should be substituted for zineb under these circumstances.

Recommended dosages: 0.5 pound of Tedion 25W per 100 gallon in thorough coverage sprays only.

TRITHION — Where Tedion has controlled citrus red mite and Texas citrus mite from early September to post-bloom or longer, Trithion has lasted until February. However, Trithion has often given excellent mite control from late November to post-bloom. Tedion is therefore preferable to Trithion in early Fall applications, but Trithion is likely to be just as effective after early November.

Trithion is a combination miticide. As such it is satisfactory for winter control of citrus rust mite and should not be supplemented with zineb or sulfur. There is also some evidence that it will control citrus flat mites.

Trithion has been reported to cause grade-lowering green spots when applied to green grapefruit. Recently it has been found that such green spots are very slight and not a threat to fruit quality when used at the recommended dosage unless it is used with oil.

Recommended dosage: 0.5 pint of

Trithion 4 Flowable or 1.0 pound of Trithion 25W per 100 gallon in thorough coverage sprays only.

KELTHANE — This combination miticide, like Trithion, is a quick killer, but usually does not give as long a period of control. Kelthane has given longer control, however, when applied during rainy weather. Early Fall applications frequently need to be repeated before postbloom, but Kelthane should give excellent results when applied after November.

Kelthane gives excellent winter control of citrus rust mite as well as spider mites and this control is not improved with either sulfur or zineb. There is also some evidence that Kelthane will control citrus flat mites.

Kelthane is compatible with neutral copper compounds, parathion and malathion, but should not be used with lime-sulfur or other alkaline materials.

Recommended dosage: 1.0 pint of Kelthane EC (Increase to 1.5 pints in warm weather) per 100 gallons in thorough coverage sprays only.

DELNAV — Although similar to Kelthane in effectiveness against rust mite, Delnav is less effective against citrus red mite. This difference, however, has not been very great in fall and winter sprays except during rainy weather or where citrus red mite was especially persistent. Both miticides are superior to DN Dry Mix No. 1 and both should be used without a supplemental rust mite miticide.

Recommended dosage: 1.0 pint of Delnav liquid-2 per 100 gallons in thorough coverage sprays only.

SYSTOX — Systox is more effective than DN Dry Mix No. 1 only slightly less effective than Kelthane. It does not control rust mite. This is a hazardous material.

Recommended dosage: 0.5 pint (1.0 pint in warm weather) per 100 gallons in thorough coverage sprays only.

DN DRY MIX NO. 1 — DN Dry Mix is the least effective of the miticides, especially during rainy weather. With few exceptions, this material will give long control only when applied extremely thoroughly to low mite populations with very few eggs. Actually, the use of this material should be confined to January and February when all that is needed is a short period of control.

DN Dry Mix does not control rust mite and must be supplemented with sulfur. The mixture of DN and zineb is not recommended because it not only does not last as long as DN and sulfur, but it causes a pronounced abnormal increase in citrus red

Complaints Against Higher Rail Rates On Citrus To New York

In the latter part of 1959 the City of New York and the New York Port Authority filed a complaint against the higher level of rates assessed by the rail lines on shipments of fruits and vegetables from the South and Southwest when destined for delivery to the piers in New York City as compared with the level of rates assessed on these shipments when delivered to adjacent points in New Jersey. In the case of Florida shipments this difference involves approximately 10c per hundred pounds on shipments of fresh citrus fruit and \$57.00 per car on vegetables moving under the per car charges.

The League and the Florida Fruit and Vegetable Association intervened in this proceeding and at a hearing in January, 1960, presented testimony and exhibits showing the unreasonableness of the higher rate applicable at the Manhattan destinations and at the same time urged that the level of the rates to the New Jersey points not be raised to the level of the rates to the New York destinations. We have since been advised that New Jersey interests have intervened in this proceeding for the purpose of maintaining the differential in the rates between the New Jersey and the New York destinations. An adjourned hearing to receive railroad testimony and exhibits was held beginning June 6, 1960, in Washington, D. C. and another hearing will be held in October.

In November, 1959, the origin rail lines filed a proposal to publish per car charges on fresh citrus fruit moving to destinations in Southern Territory on the same level as the per car charges which have been published on vegetables to the same destinations. This adjustment also provided for mixed shipments of vegetables and citrus in the same car, but restricted the per car charges to apply only in refrigerator cars not exceeding 33 feet 6 inches in length. This proposal was approved by the Southern lines and the per car charges became effective on February 19, 1960.

mite at the end of the control period. Do not use DN with oil or in alkaline solutions.

Recommended dosage: 0.66 pound of DN Dry Mix No. 1 per 100 gallons in thorough coverage sprays only.

Soil Science Foundation's Approach To Acid Flatwoods Soils For Citrus Production

... By ...



DR. O. C. BRYAN
TECHNICAL DIRECTOR
SOIL SCIENCE FOUNDATION

The acreage of upland (ridge) soils in the citrus belt is about exhausted, and real estate developments and home sites are encroaching on citrus plantings in places. Because of these conditions it appears necessary to investigate and search for suitable citrus soils in other areas.

Although a large acreage of flatwoods soils lies within the citrus belt, they are used for citrus to a limited extent with varying degrees of success. Most of these soils have poor drainage with risky air pockets, and contain an organic hardpan. Furthermore, they are strongly acid, and deficient in all plant nutrients including trace minerals. Whether or not these are the only limiting factors only time will tell. It is true that neutral soils in the flatwoods are successfully used for citrus when drained and properly managed.

This investigation, financed and sponsored by Soil Science Foundation, was undertaken to determine the possible use of the acid flatwoods soils for citrus through adequate water control, breaking of hardpan, and a judicious use of lime and fertilizers. Since relatively no experimental studies have been conducted on these soils, it appears advisable to begin with basic treatments. Whether or not it is possible to duplicate the conditions of poorly drained neutral soils, is yet to be determined.

The experimental site is located on Leon-Immokalee fine sand with a hardpan 24 to 32 inches below the surface and having an elevation of 126 to 130 feet above sea level. The site consists of 40 acres located on Road 62 in northeast Manatee County.

The project is entirely investigational in nature and is admittedly a venture. But it is felt that a systematic study will lead to a helpful and constructive understanding of the needs of such land for citrus. The study was inaugurated in 1959, first by constructing canals to remove excess water. The land was laid out in 48 blocks or plots 600 feet long and 50 feet wide, in such a manner that the fertilizer treatments could be made with a minimum of labor and management.

After the land had been cleared and freed of stumps and palmettos,

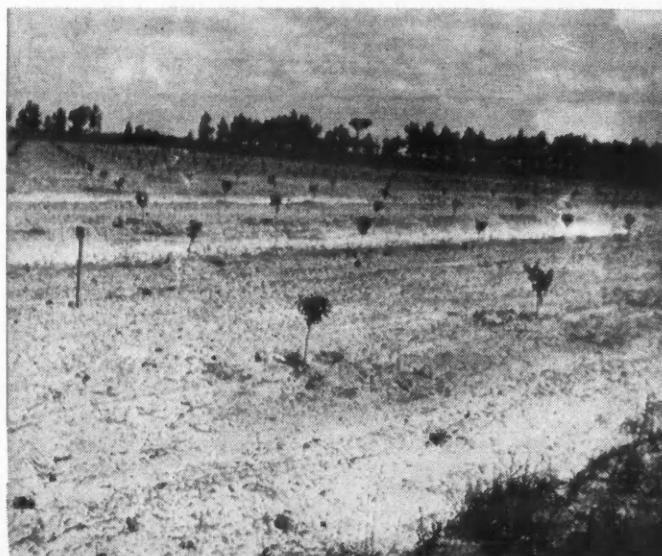
ing the soil in the upper 32 inches of soil. The following lime treatments were made in properly laid out blocks: (a) 4 tons lime screenings per acre were cut in the surface 8 inches of soil, (b) 4 tons of the screenings were cut into the soil 32 inches deep, (c) 4 tons lime screenings and 4 tons dolomite per acre were cut into the soil 32 inches deep. See grove sketch for layout of plots and treatments.

After the lime and dolomite had been applied and indicated disking and plowing completed, beds were constructed 50 feet wide and 30 inches high with crowned tops to permit complete removal of surface water. Following this, 2 tons of dolomite per acre were disked into the soil in the usual manner. The following fertilizer treatments were used. See sketch for details.

Each of the ten different fertilizer treatments was replicated 3 times and so distributed over the grove to permit dependable data for interpretation. One assumed treatment, namely, 8-6-8-3 was distributed uniformly over the grove to help evaluate soil variations.

Queen orange buds on sour, lemon and sweet roots were used. The treatments for sour and lemon rootstocks

the following treatments were made, each to be crossed by the 48 beds or blocks: (a) normal check, no pan breaking, (b) subsoil breaking of pan 32 inches deep without mixing the soil, (c) breaking the pan and mix-



General View of Duette Grove 3 months after setting trees

are identical. The trees were set 25 x 20 feet on the beds which were designed to cross the subsoil and deep plowing treatments. (See outline). Oats were planted in January to serve as a cover crop and the trees set in March 1960. One fertilizer application has been made in addition to the special treatments.

The records to date indicate that the water control system permits adequate removal of excess water, and that the oats has served as a timely cover crop during the heavy spring rains with no visible effects of the deep plowing on oats. Weather conditions have been favorable since the trees were set, and with the exception of a severe infestation of aphids, the trees appear normal and

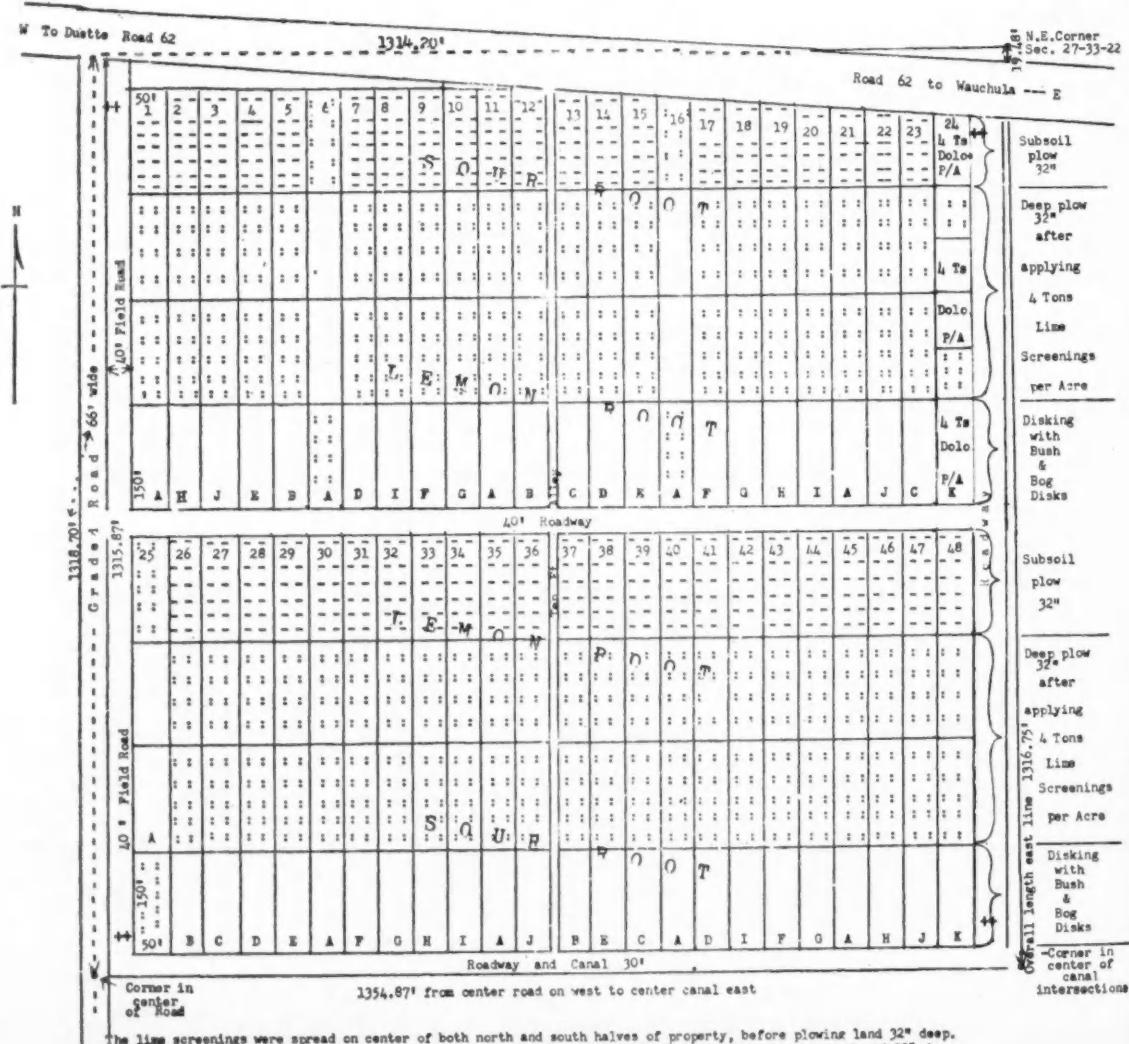
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Treatment*	Plot Nos.	Analysis	Materials and Time of Application											
			1, 6, 11, 16, 21	8-6-8-3	Broadcast around trees as needed, 1/2 lb. per foot tree spread									
A	25, 30, 35, 40, 45													
B	5, 12, 26, 37	8-6-8-0												
C	13, 23, 27, 39	8-6-8-6												
D	7, 14, 28, 41	8-6-4-3												
E	4, 15, 29, 38	8-6-8-3												
F	9, 17, 31, 48	8-0-8-3	P ₂ O ₅ and trace minerals at 4 year intervals											
G	10, 18, 32, 44	8-0-8-3	Same as F plus 1 Ton Fairfield Slag per acre											
H	2, 19, 33, 46	8-2-8-3	Same as A, except P ₂ O ₅											
I	8, 20, 34, 42	8-0-8-3	2 Tons Fairfield Slag, no P ₂ O ₅ , no trace elements											
J	3, 22, 36, 47	8-0-8-3	Same as F, plus nutritional spray											
K	24, 48	8-0-8-3	Same as J, with twice dolomite											

The following treatments: 600 lbs. super phosphate, 60 lbs. MnO₂, 40 lbs. ZnO, 30 lbs. CuO, per acre, in 10 foot bands on rows after bedding, were given to all plots in F, G, H, J, K, before setting trees.

*8-6-8-3-6-3-3-2, N-P₂O₅-K₂O-MgO-CuO-ZnO-B₂O₃, respectively (for 2 years). Thereafter as needed from soil tests. Nitrogen 3 units NO₃, 3 units NH₃, 2 units Organic. Phosphates derived from Super, Potash 5 units Muriate, 3 units Sulphate. MgO, CuO, MnO, ZnO, B₂O₃, from soluble sources.

(Scale 1 cm equal 50')



The lime screenings were spread on center of both north and south halves of property, before plowing land 32" deep. The plow was lifted over plots 6, 16 and 25. But both the north and south ends of these plots were plowed 32" deep.

Entire area disked with Bush and Bog disk, then with grove disk.

* The dolomite on plot 24 was in addition to the regular lime before plowing.

** The roadway blocks on the east and west sides contain sweet rootstock.

Opening Of The 1960 Hurricane Season

A statement issued by G. E. DAIL, Jr., Executive Director, Central and Southern Florida Flood Control District.

As we enter another hurricane season, it is a sobering thought that the FCD long range program designed to conserve water and provide flood protection, is only about 22 percent complete as its 11th year of operation nears its conclusion.

This status of considerable incompleteness is due to the lack of adequate Federal and State appropriations which the FCD needs to do the job.

Therefore, there are numerous areas in our 18 county-wide District which face this new hurricane season without FCD protection.

Flooding Can Be Expected

It should be remembered that in many hurricanes, wind and rain damage exceeds damage from flooding which results from the excessive rains which hurricanes usually bring with them.

The FCD is a program against actual flooding, but offers no protection against wind or rain, for example, driving through windows in homes and commercial properties.

We must squarely face the fact that regardless of the quantity and quality of the FCD's primary water conservation and flood protection works, there will always be areas which experience flooding in such times as those of hurricane visitations.

But, where the FCD's big primary flood control works exist, and in areas where these are supported by adequate secondary works of local authorities, such flooding will tend to be of short duration. Such floods will, therefore, cause more inconvenience than actual damage.

In other words, any hurricane which may dump some six to fifteen inches of water on an area in a 12 to 24 hour period, is going to create at least a flood situation to some extent. But adequate secondary flood control systems wedged to our FCD primary system will minimize the flood damage, by very greatly lessening the stages and periods of flooding.

State of Preparedness Completed

As vital parts of our program to prepare for such disasters as hurricanes, the water level at Lake Okeechobee must be lowered so that it can contain safely flood waters which rush into it from the Kissimmee

River valley.

Water levels in the three great Water Conservation Areas south of Lake Okeechobee—which together represent an area about twice as large as Lake Okeechobee—have also to be lowered.

This preparatory work has been done.

Current Report On the Various Watersheds Within the District

Heavy rains late last year, and again earlier this year, has left Florida still a very wet State as this new hurricane season opens.

The St. John's River valley was this year only slightly below its maximum recorded discharges for any May since records have been maintained.

The Kissimmee River basin which has been in a soaked condition now for a long time was still at a maximum stage of record for May—or 4½ times above its normal for May—according to the U. S. Geological Survey for that month.

Average flow under the Tamiami Trail was reported eight times above normal for May.

The desirable level for Lake Okeechobee on June 15 is 13-feet above sea level.

When a Hurricane Warning Is Received

When a hurricane warning has been sounded, the FCD will spring to its emergency stations throughout that part of the giant project now completed.

This completed part of the project, in addition to the many FCD canals, pump stations, control structures, etc. includes the East Coast levee. This will be like a shield protecting the heavily populated coastal communities of the lower East Coast area, against such inundation of swirling waters washing to the shore from the Everglades, as those which created havoc in 1947 in that area.

Incidentally, construction is soon to begin on an interior levee in Broward County's Conservation Area No. 2 which will add to this protection. And within a year, construction on the first diagonal interior levee in Conservation Area No. 3—of great importance to Dade County—is scheduled for construction.

Control structures facing the ocean will be opened wide to provide maximum discharges; westward control structures will be slammed shut to keep flood waters from invading coastal areas.

This year there will also be available for the first time, if a fight against hurricane waters occurs a new \$2 million pump station (S-7) located in the North New River Canal on the western-most corner of Conservation Area No. 2.

Constructed by the U. S. Corps of Engineers for the FCD, this facility, capable of removing $\frac{1}{4}$ inch of runoff per day from a 125 square mile area, has already been taken over by the FCD for "beneficial purposes" from the Corps, for use in emergencies.

(Continued on next page)

SOIL SCIENCE FOUNDATION'S APPROACH TO ACID FLATWOODS SOILS FOR CITRUS PRODUCTION

(Continued from preceding page)
are growing off in good shape.

It is to be thoroughly understood that this study is an experimental project to serve as guides in the production and management of citrus on these types of soils. Naturally, it is a venture for Soil Science Foundation, and no claim is made regarding the future results other than that systematic records will better serve as guides in the use of these lands than irregular trials and errors.

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Lake Hamilton Cooperative Expansion

Anticipating a growing supply and demand in Florida fresh citrus fruit, the big Lake Hamilton Cooperative, Inc., organization is one of only two packing houses in the state with a program of major expansion underway this summer, it is reported.

Robert E. Snively, general manager of the organization, operating as an independent tax-paying cooperative, said, "upwards of a quarter million dollars" would be spent within the next 90 days in building a 25,000 square foot addition to the packing house, installing a new tangerine packing unit and providing six new coloring rooms.

Established by the veteran H. B. "Pete" Snively 17 years ago, the Lake Hamilton organization for a number of years has ranked in the top four fruit packing houses in fresh packed citrus, ranging in the one million box bracket for that period of time.

The co-op's basic operation is a packing house, which for many years was known as the "Exchange house" here, located in the heart of the prolific Ridge producing area.

The announcement of the extensive expansion program, right at a time when many houses are cutting back, came on the heels of the appointment of H. R. "Tuffy" Griffin as general sales manager to replace the retiring veteran, Lester I. Collier, who went with the organization at its inception.

Griffin took over the post after a long tenure as fresh fruit sales manager with the Adams Packing Association at Auburndale and more recently with the Lakeland Packing Co., at Lakeland. Griffin is generally considered to be one of the top fresh fruit sales managers in the citrus industry and has served on many industry committees having to do with federal marketing agreements, sales procedures, general merchandising and other subjects.

With the retirement of "Pete" Snively from active participation in the operation, Bob Snively has two brothers closely associated with him. Frank B. Snively is corporate president of the co-op, of which Harvey B. Snively, Jr., acts as production manager.

The "Pete" Snively family, in its own right, produces a considerable portion of the fruit that goes to fresh and processing channels through

Lake Hamilton Cooperative and its affiliates.

The general manager said, "With Griffin as our general sales manager and with the expansion of our facilities, we are now signing new grower tonnage and can reasonably expect a total handle of about two million standard box equivalents, mostly to fresh, the rest to processing, in the coming seasons."

With "Hamiltonian" and "Earth Gold" as its two major brands, Bob Snively said, "The organization will, as in the past, insist on top quality fruit from the tree to the consumer." He added, "We are constantly working, and the current expansion program is evidence of this fact, toward improved packing house procedures and processes which will insure top quality arrival of our fresh fruit in the markets and on the tables of the ultimate consumer."

Taking a leaf from the notebook of his father, who for years has been known as a quality proponent, the younger Snively said, "It does no good to us, the industry or the state as a whole to pack good fruit, only to have it arrive on the markets in poor condition, and we hope in the modernized and expanded packing house to take full advantage of all the known factors to insure top quality arrival."

At the present time the Lake Hamilton organization employs about 500 persons in all phases of its operation, grove to packing house, with a large number on the year-round payroll for maintenance of both production and packing facilities.

OPENING OF THE 1960 HURRICANE SEASON—

(Continued from preceding page)

and will soon be taken over formally and completely.

Personnel Emergency Alert Program

We have emergency alert procedures which go into operation immediately a hurricane warning is given—or even beforehand, if excessive preliminary rains are falling.

Under these orders, our pump stations begin operating on an all-out, self-contained-unit basis. Each Pump Station has food for its well trained personnel. Each generates its own power. Each is equipped with sandbags and sheet piling, etc. to meet unexpected crises.

FCD Headquarters in West Palm

Beach becomes at once a "nerve center" with its two-way radio network maintaining communications throughout the FCD entire system.

Our field station, in West Palm Beach serving the Central area, of the Project and field crews at Fort Lauderdale covering the Broward County and North Dade are equipped, manned and ready for emergency action.

We are now in the final process of establishing another field station at Okeechobee to meet the needs of our developing system north of Lake Okeechobee, particularly in Glades, Highlands and St. Lucie counties.

Therefore, if a hurricane comes, the FCD—within the limitations of its still only some 22 per cent of completeness—spring to the defense of life and property within its area of responsibilities.

78,163,845 GALLONS OF ORANGE CONCENTRATE IN 1960

Florida citrus processors packed a little over 78 million gallons of frozen orange concentrate for the 1959-60 season, Robert W. Rutledge, Florida Citrus Mutual executive vice president said in a wind-up report on frozen concentrate.

"Total concentrate pack from Dec. 1, 1959, through June 25, 1960, is about 1,750,000 gallons less than last season's record pack of 79,911,000 gallons," Rutledge said. "This season's total pack through June 25 is 78,163,845 gallons."

Rutledge predicted earlier in the season that concentrators would finish the season with a total pack of about 78 million gallons.

Movement of orange concentrate from processor's warehouses for the first 30 weeks of the marketing season is 50,355,000 gallons as compared with 43,360,000 gallons moved during the corresponding period last season, he said.

"Concentrate movement this season to date is five million gallons greater than any previous movement in the history of the concentrate industry," Rutledge said.

Consumer purchases of concentrate to date have been 30 per cent greater than last season, he said.

HARDIE Duo-Fan



17 MODELS TO CHOOSE FROM

Some Recent Work On Citrus Sections

For many years citrus sections have been a staple commodity. The market is not large but it is steady. If the pack is limited to what can be sold at a fair price a good profit is realized.

But the demand for sections does not increase in proportion to the sales of some other citrus products. Why this condition exists we do not know.

It may be a matter of quality. Early in the season the sections have a harsh, bitter taste that is disliked by some. If packed too early the cells have a tendency to separate and become "ricey."

Late in the season, when the flavor of sections is at its best, the fruit becomes soft and the cells are flabby. The consumer does not like these soft, broken segments any better than she likes the bitter sections in the early part of the season.

There is a growing market for geriatric and dietetic foods and we offer juice packs and water packs to fill this need — but the market is limited and is not increasing.

This paper is concerned with our efforts to:

- (a) Make better sections early in the season.
- (b) Produce better sections late in the season.
- (c) Pack more palatable sections for the dietetic and geriatric trade.
- (d) Pack better frozen sections.

Citrus Segments for Freezing

For the first test, we used plain No. 2 cans in which grapefruit sections were packed in the following ways, frozen in a tunnel at -45°F , and stored at -10°F .

Ascorbic Acid

Using No. 303 X 406 enamelled cans, orange sections, salad and grapefruit sections were packed with and without 50 mg. ascorbic acid per 100 ml. of the respective juices. Juices were added to cover sections in cans. All cans frozen at -45°F , and stored at -10°F .

Some panel members thought that the samples with ascorbic acid were slightly better than controls but were still off flavor and definitely stale.

Many other combinations with ascorbic acid were tried but all went stale within three months storage at -10°F . Orange sections were tough on thawing.



GRAY SINGLETON
SALADA SHIRRIFF HORSEY, INC.
PLANT CITY

Ions of water and some cans had 55° brix sucrose syrup. Cans were sealed and immersed in hot water, then quickly cooled.

Blanching seems to give an effective method for freezing sections where sucaryl is used to sweeten. If sucrose or dextrose-sucrose syrup is used the sections become soft and lose their fresh flavor if heated enough to lose the harsh, bitter taste of early fruit.

The best flavor, texture and color are found in sections where peroxidase is not completely inactivated. There may be other enzymes involved which are inactivated at less time and temperature than is required for peroxidase. For instance, tests were run for catalase. They were positive on the controls but negative on No. 60153-3.

In order to avoid, if possible, the blanching which would involve added expense, tests were run to see if an additive could be found that would serve the purpose.

Chilled Sections

To those who are packing chilled sections the following work may be of interest.

On March 9, 1955, freshly sectionized segments were dipped in 54° Brix syrup to which had been added 2.4 grams of Sustane No. 3 to each 4.5 quarts of syrup. This is equivalent to .05 grams of sustane for each 10 ounces of fruit.

Excess syrup was drained off and sections were packed in enamel lined 30 pound cans with polyethylene liners. Stored at -10°F .

On October 23, seven months later, sections were thawed and found to have as good color, flavor and texture as when packed.

(Continued on page 22)

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The LYONIZER

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Reports Of Our Field Men . . .

WEST HILLSBOROUGH, PASCO AND PINELLAS COUNTIES

Calvin P. Lloyd, III
Tampa, Fla.

In general our citrus groves look very good as a result of the work of fertilizing, spraying, and discing and good growing conditions of the past month.

A close check should be kept on the drainage conditions of the individual groves in case we have another deluge as was the case last year.

As for the insect problem, scale has not shown up in the groves as yet but the rust mites seem to be quite prevalent and a close check should be kept because these can cause a great amount of damage in a short period of time.

If I can be of any assistance, do not hesitate to call me through the Lyons office.

SOUTH POLK, HIGHLANDS, HARDEE AND DeSOTO COUNTIES

C. R. Wingfield
Phone: Glendale 3-4537
Avon Park, Fla.

While rains have been very spotted I believe most of this area has had sufficient to maintain good moisture conditions. Temperatures have been high but with some rains it has not been too bad.

After the summer fertilizer application the groves have been layed by and the cover crops are doing well. It will not be long before some cover crops will be ready to begin chopping. The trees are looking good and while a lot of fruit dropped in June it appears we will have a fair crop. Fruit has sized well and looks clean at this time. Oil sprays are still being applied but are almost complete at this writing. Rust Mite population increased in June and early July before much oiling was done and some damage was done. A watch should be kept on the insect.

Land is being prepared for the fall vegetable crops but it is early to tell what will be planted.

SOUTH HILLSBOROUGH, MANA- TEE AND SARASOTA COUNTIES

R. C. Revels, Jr.
P. O. Box 3332, Apollo Beach, Fla.

Most of the sections have had rain here in South Hillsboro, Manatee and Sarasota Counties. Rainfall has varied from just under two inches to more than six inches in some places. With the tomato crop just over these rains were welcomed with open arms because the groves were getting dry enough that some growers were watering to save the fruit crop.

With the dry weather came rust mites, purple mites and red and soft brown scale, and being as dry as it was, the summer oil sprays were delayed in most groves to the danger point. Most growers have put on the summer spray application by this writing and the mite and scale infestation has been cut down to ineffectiveness.

Most vegetable growers that are figuring on a fall crop have cut their land and taken soil samples in an effort to have their land in as good a condition as possible for the fall crop. Most fields that will be planted in the spring have been cut and cover crops planted.

There is not much to report from the vegetable farmers as this is between crops for most farmers.

There is quite a bit of work going on in the groves throughout the area as growers start their pruning and hoeing of the trees and planting cover crops to be cut in next fall. By this time next month we will have a few crops being planted as growers indicate a fair acreage of potatoes, cabbage and fall tomatoes.

NORTH CENTRAL FLORIDA

V. E. Bourland
Winter Garden, Fla.
Phone 107

We are having wonderful growing weather now, warm and rainy. All the groves look good, and fruit sizing satisfactorily. New growth with some bloom. Cover crops are good, best in many seasons. Growers are very busy with

their spraying between showers, and heat. Some pruning being done. The biggest job is hoeing and sprouting young trees.

All ditches should be checked now, so water can get off the low spots of groves before September rains.

HIGHLANDS AND POLK COUNTIES

R. E. Lassiter, Jr. & R. S. Carlin
P. O. Box 1304
Winter Haven, Fla.

In most areas of this district rainfall has been sufficient to promote a good summer flush and a satisfactory cover crop growth.

The summer scalicide should be completed by the time this is published. As a rule, scale has not been a serious problem in most groves this summer. Rust Mite has been a problem in many blocks and growers should continue to watch for any increase in population following the summer spray. Ordinarily, it takes three weeks following the spray to effectively analyze the success of Rust Mite control when Zineb is used. Zineb tends to have a slow killing effect, but the residual properties should give extended control.

Growers should continue with the young tree program fertilizing their trees every four to six weeks according to the schedule started in the spring.

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***Uncle Bill Says:***

They is a TV program which keeps boastin' somethin' to the effect that progress is their most important product . . . and while it might seem sort of silly at first they is an awful lot of truth in the fact that with most everyone progress is a mighty important product 'cause if any industry or any business don't make progress they ain't but one way to go and that way is back . . . the feller who don't go ahead ain't necessarily goin' back from where he was, but he is losing ground all the time compared to the feller who is goin' ahead all the time.

So it is in this business of raisin' fine fruit and vegetables . . . if'n we tried to produce good crops by exactly the same methods as we did 50 years ago we'd find ourselves so fur behind the times we'd never catch up, while our crops wouldn't compare by any favorable yardstick with those which even us just average growers can raise.

All of which makes us mighty grateful that our boys and girls has fine schools, like our colleges and universities of today, to study in and to learn the most successful methods of helpin' to operate our groves and farms and households . . . and that they kin also consult with our experiment stations and confer with others who are recognized as authorities and who gladly give of their knowledge to those who seek it.

They ain't no one general overall rule which will cure all our growin' or pest problems . . . but they is one good rule which we have observed over the past more than a third of a century, that really works . . . that rule has stated and proved all these years that "Lyons Fertilizers Produce Maximum Crops of Finest Quality."

SOME RECENT WORK ON CITRUS SECTIONS

(Continued from page 19)

Repacked, the same day, 10 No. 2 plain cans in 4 ounces of 50° Brix sucrose-dextrose syrup, exhausted 20 min. in 185° F. water sealed and processed 22 minutes at 185, cooled in tap water. Stored one year at room temperature. Slightly soft but still fancy grade. Still good at 3 years.

Another portion of the sections which had been frozen for seven months was filled into the type of quart jar used for chilled sections. Each jar had 7 ounces of 50° brix syrup containing 0.1% of Benzoate of Soda. Stored jars at 40° F.

On March 27, 1957, the last jar was opened and graded. They seemed as good as when packed more than two years before.

This indicates that, with the combination of Sustane No. 3 and Benzoate of Soda, we can pack sections at best maturity and keep them until summer, then repack in chilled salad.

Dietetic Pack

For many years there has been a small market for grapefruit sections prepared without sugar or salt. Sodium Chloride is sometimes used to mask the strongly bitter flavor in the early part of the season.

This dietetic Pack has been in either water or juice and the taste has not been relished by many.

In the spring of 1953 we started a series of tests designed to give dietetic sections with more acceptable flavor. We tried many sweeteners but only one met all the tests. This was the calcium salt of cyclohexane-sulfamic acid. This is sold under trade names such as calcium sucaryl and calcium cyclamate.

Some of the characteristics of this material are:

Better Flavor: Test panels run at regular intervals over a period of three years always favored the cyclamate or sucaryl packs over our regular sugar packs. This has held true for commercial packs for the past three years.

Cost: 1 gallon 55° Brix syrup, sucrose costs \$0.495. 1 gallon cyclamate syrup, equal sweetness costs \$0.076. Cyclamate syrup costs about one-seventh as much as syrup made with cane sugar.

Yield: Cyclamate syrup has very little soluble solids content and is, therefore, absorbed into the sections instead of drawing the juice from the sections. For example: we want to pack in No. 303 X 406 cans and have a drained weight of 11 ounces, with sucrose syrup of dextrose su-

croze syrup, we put into the can 12 ounces of fresh sections and 2½ ounces of syrup, by weight. The syrup pulls out of the sections from one-half to three-quarters of an ounce of juice. Our drained weight, after two weeks storage, will probably be about 11½ ounces.

If we are using sucaryl syrup we put in 9 ounces of sections, instead of 12 ounces, and 2½ ounces of syrup. The juice in the sections, having a higher soluble solids content than the syrup, draws the syrup into the sections and, after two weeks storage, we have a drained weight of about 11½ ounces.

With sucaryl syrup we used 9 ounces of fruit. With sugar syrup we used 12 ounces to get the same drained weight, about 11½ ounces.

The above figures will vary con-

siderably, depending largely on the brix of the juice in the sections.

We have packed sections in cyclamate syrup, commercially, for three years. It is not foolproof. If used early in the season it tends to swell the juice sacs and make the sections

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8,000 Hamlin on rough lemon

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ricey. The calcium precipitates the pectin in the cell walls and makes them tough.

On the other hand, used late in the season, when sections become soft and flabby, the cells absorb the syrup and become plump and firm when, with sugar syrup, they would be too soft to pack.

Summary

(A) Citrus sections can be held at good flavor and appearance for long periods by partial blanching before freezing.

(B) A very superior dietetic pack of citrus sections can be economically packed by using the calcium salt of cyclo hexane-sulfamic acid for sweetening instead of sugar.

(C) Citrus sections can be frozen at their peak of quality by using Sustane No. 3 when packing in 30 pound cans, to be held frozen for repacking during the summer.

NOTED NEMATOLOGIST RETIRES FROM STATE AGRICULTURAL STAFF

Dr. J. R. Christie, noted nematologist and member of the Florida Agricultural Experiment Station staff since 1955, retires June 30.

A native of New Boston, N. H., Dr. Christie received degrees from the University of Kentucky, University of Maryland and George Washington University.

After joining the United States Department of Agriculture in 1922, he occupied positions with the Division of Nematology at Falls Church, Va.; Washington, D. C.; Beltsville, Md.; and Sanford, Fla. He retired from USDA as senior nematologist in 1954.

After leaving the Division of Nematology, he spent a few months investigating the soil nematodes of Indonesia at the request of the Foreign Agricultural Service.

Dr. Christie has received several honors in recognition of his outstanding services to agriculture, the federal government and the state of Florida. He recently received an award from the Florida Fruit and Vegetable Association for his scientific contribution to Florida agriculture. The award specifically recognized his invaluable finding concerning the ectoparasitic nematodes of plants.

As an author, Dr. Christie has written many papers and reports on nematology. His book, "Plant Nematodes, Their Bionomics and Control," was published in 1959 and is being sold throughout the world by the Florida Experiment Station.

KEY SCALES ACQUIRES G&S PACKING COMPANY

Key Scales, 22-year veteran in the Florida citrus deal and for ten years a member of the Florida Citrus Commission, serving as head of its ad and merchandising committee and as chairman of the state agency and now as legislative chairman, has announced that he has acquired full control of G&S Packing Co., which specializes in wholesale gift fruit packages, serving retail outlets over the state.

The G&S firm was established five years ago, and last year sent out some 200,000 gift fruit packages on orders from retail outlets, using the customers' labels.

SUGGESTS 2 CHEMICALS FOR NUTGRASS CONTROL

Gainesville, Fla.—Nutgrass is one of the ever-present plagues to Florida farmers and homeowners alike.

Here are some pointers on controlling nutgrass from Dr. E. G. Doders, associate agronomist with the Florida Agricultural Experiment Station.

There is no chemical which will give 100 percent permanent control of nutgrass, but there are some effective control methods.

For small areas, fumigate with

EXTENSION STAFF IN ORIENTATION SESSION

Gainesville, Fla.—New staff members of the Florida Agricultural Extension Service gathered at the University of Florida recently for the organization's annual orientation conference.

The group represented 15 Florida counties and state staff members from Tallahassee and Gainesville.

Counties represented were Manatee, Pinellas, Polk, Sumter, Baker, Brevard, Clay, Dade, Duval, St. Johns, Escambia, Columbia, Lake, Orange and Collier.

The three-day conference stressed 4-H Club work, agricultural and home demonstration programs, communications, organizational policy, professional improvement and training, and program evaluation, including subject matter objectives.

methyl bromide to kill the plant pest. When this material is used, you must cover the soil surface with an air-tight cover after the material is applied.

On a field basis, a material called Eptam shows the most promise in controlling nutgrass. This material requires no cover. Use at the rate of six pounds, or one gallon of the liquid material, per acre.

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For a long, long time every grower has been aware of the fact that High Quality Fruit brought him better returns for his citrus crop than inferior fruit would bring.

And it is just as much a foregone conclusion that in order to raise High Quality Fruit in adequate volume it is necessary to have strong, healthy trees.

In order to have such trees Florida Growers have long since adopted the practice of seeing that their citrus trees were adequately and properly nourished by the application of high type fertilizer which has been designed to care for the requirements of each particular grove.

The fact that so large a number of the state's most successful growers have continued throughout the years to apply Lyons Fertilizers to their groves furnishes ample proof of the high quality of our fertilizers as is reflected in the exceptionally fine crops they produce.

In the event you have problems in cultural practices or in production we are prepared to help . . . our Field Service Men will gladly give every possible service and counsel to you.

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